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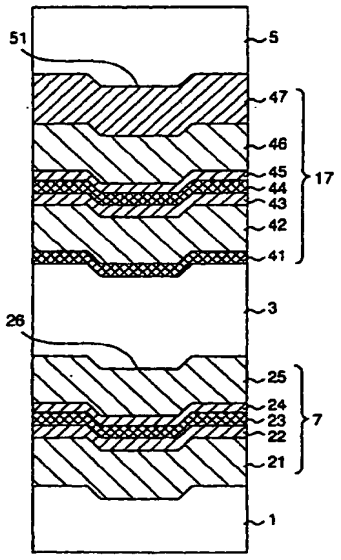
(54) Optical information recording medium, recording and reproducing method therefor and optical information recording and reproduction apparatus

(57) A multi-layer optical information recording medium has a first information layer (7) located at the incident side for a laser beam and another information layer (17) at the back thereof. Thus, it has a large capacity. A relationship that R1a < R1c and R2a > R2c holds for the reflectances R1a and R1c of the information layer (7) in a recorded portion and in a non-recorded portion, and the reflectances R2a and R2a of the information layer (17) in a recorded portion and in a non-recorded portion. A relationship that A1a < A1c holds between the absorptances A1c and A1a of the first information layer in the crystalline state and in the amorphous state. Similarly, a relationship that A2a < A2c holds between absorptances A2c and A2a of the second information layer in the crystalline state and in the amorphous state. Thus, signals can be written to the recording medium at a fast speed and at high sensitivity.

Fig.2



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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	2 September 2003	Holubov, C

CATEGORY OF CITED DOCUMENTS

X: particularly relevant if taken alone
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A: technological background
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The present search report has been drawn up for all claims

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X : particularly relevant if taken alone
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CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☒ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

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LACK OF UNITY OF INVENTION
SHEET B

Application Number
EP 99 10 9542

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. Claims: 1-15

An optical information recording medium comprising first and second reversible phase change recording layers wherein R1a < R1c (where R1a and R1c are the reflectances of the amorphous and crystalline states of the first recording layer) and R2a > R2c (where R2a and R2c are the reflectances of the amorphous and crystalline states of the second recording layer), and/or wherein A1a < A1c (where A1a and A1c are the absorbances of the amorphous and crystalline states of the first recording layer) and A2a < A2c (where A2a and A2c are the absorbances of the amorphous and crystalline states of the second recording layer).

2. Claims: 16-17

A method for fabricating an optical information recording medium comprising the steps of forming first and second information layers including a first and second reversible phase change recording layers, subjecting at least one of said first and second information layers to initial crystallization, and adhering the first and second information layers.

3. Claims: 18-19

An optical information recording medium comprising a first information layer including a first recording layer to which information can be recorded by exposure to a light beam, an intermediate transparent layer formed on said first information layer,a second information layer including a second recording layer to which information can be recorded by exposure to a light beam, and an overcoat layer formed between said first information layer and said intermediate transparent layer or between said second information layer and said intermediate transparent layer.

4. Claims: 20-22

An optical information recording medium comprising first and second recording layers to which information can be recorded by exposure to a light beam, wherein said first recording layer includes a region wherein recorded marks have been formed. (According to the description, these are "dummy signals" recorded beforehand.)
Also a method for recording information in an optical information recording medium with first and second recording layers comprising the steps of setting a reproduction

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LACK OF UNITY OF INVENTION
SHEET B

Application Number
EP 99 10 9542

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

position in said second recording layer, deciding whether signals have been recorded in said first recording layer in front of the reproduction position or not, and recording signals to said second recording layer with a laser beam transmitting said first recording layer only when signals are decided to be recorded in said first recording layer in front of the reproduction position.

5. Claims: 23-26

A method for reproducing information recorded in first and second recording layers of an optical information recording medium, comprising the steps of deciding whether signals are to be reproduced from the first or second recording layer, and reproducing signals recorded in the first recording layer with a laser beam of a first power, and reproducing signals from the second recording layer with a laser beam transmitted through the first recording layer and having a second power higher than the first power. Also a corresponding apparatus.

A method for reproducing signals from a first multi-layer optical information recording medium having two recording layers to which recording and reproduction are performed with a light beam from a side of the recording medium, and from a second read-only optical information recording medium, the method comprising the steps of discriminating whether the optical information recording medium to be reproduced is the first or second optical information recording media, and reproducing signals recorded in the second medium with a laser beam of a first power and reproducing signals recorded in the first medium with a laser beam of a second power higher than the first power. Also a corresponding apparatus.

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